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Research Article

COMPARATIVE EVALUATION OF CLINICAL EFFICACY OF PROPOLIS AND TETRACYCLINE FIBRES AS LOCAL DRUG DELIVERY AGENTS IN TREATMENT OF PERIODONTITIS

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ABSTRACT

Background: Propolis, sometimes called bee glue, is a natural resinous substance collected by honey bees. Various studies have confirmed its anti-inflammatory and anti-infective properties. Periodontitis is an inflammatory disease and in most of the cases advocates the use of an antimicrobial and anti-inflammatory agent to control the progression of the disease. Thus, this study was aimed at comparison of clinical evaluation of the efficacy of subgingivally delivered Indian propolis extract with tetracycline fibres in the treatment of periodontitis. Materials and methods: A total of 15 subjects (30 sites) were recruited for the study. The sites were randomly divided into two groups – group I and group II. The sites in group I received SRP followed by subgingival placement of tetracycline fibres and the sites in group II received SRP followed by subgingival placement of Indian Propolis as the local drug delivery agent. The clinical parameters of Gingival index (GI), plaque index (PI), probing pocket depth (PPD) and clinical attachment level (CAL) were recorded at baseline, 2 weeks and 3 months post drug delivery. Results: The results revealed that there is a significant reduction in the PI and GI in both the groups with slightly more reduction seen in group II (ΔPI = 1.084±0.182; ΔGI = 1.7±0.116) compared to group I (ΔPI = 1.09±0.249; ΔGI = 1.45±0.044). Also, the PPD and CAL showed significant improvement in both the groups with marginally better results in the group II (ΔPPD = 2.634±0.268; ΔCAL = 1.754±0.032) compared to group I (ΔPPD = 1.667±0.215; ΔCAL = 1.533±0.037). Conclusion: The results of the present study have shown that the Propolis is marginally better than tetracycline fibres as a local drug delivery agent in treating chronic periodontitis.

Key words:- Propolis, local drug delivery, periodontitis.

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INTRODUCTION

Periodontal disease is a multifactorial disease in which the etiological role of bacteria is an established fact. The prevention of periodontal disease requires a reduction of subgingival microbial plaque mass or at least a suppression of periodontopathic bacteria. Scaling and root planing (SRP) is usually effective in removing the calculus and plaque and, therefore, reduces the bacterial load and probing pocket depth. [1-3]

Scaling and root planing (SRP) is the gold standard, but this mechanical debridement alone may fail to eliminate the putative pathogens from the pockets completely because of the invasion of these organisms within the gingival tissue or in deeper areas inaccessible to periodontal instrumentations and thus, results in recurrence of periodontal disease. [4]

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Propolis, sometimes called bee glue, is a natural resinous substance collected by honey bees (Apis mellifera L.) from plant buds and bark exudates. Propolis is a very complex mixture and its chemical constituents vary according to its source. A broad analysis reveals approximately 55% resinous compounds and balsam, 30% beeswax, 10% ethereal and aromatic oils, and 5% bee pollen. [5]

The potential of this beehive product as a natural antibiotic has long attracted interest.

The antimicrobial activities of natural derivatives, such as propolis, have been researched over recent years as alternatives for new therapeutic strategies. The presence of flavonoids, as well as phenolic, aromatic and diterpene acids, in the composition of propolis, has been associated with various biological attributes, including its anti-inflammatory, anti-infective and antifungal properties. [6]

The infectious nature of periodontal disease and the inherent limitations of scaling and root planing leads sometimes to the use of antimicrobial agents in order to reduce periodontal pathogens as advocated by the Committee on Research, Science, and Therapy in 1996. Locally delivered antimicrobials are an alternative to systemic antibiotics and may help to arrest periodontal disease progression. [5]

Thus, this study was aimed at comparison of clinical evaluation of the efficacy of subgingivally delivered Indian propolis extract with tetracycline fibres in the treatment of chronic periodontitis.

MATERIALS AND METHODS

The study was a randomized controlled clinical trial conducted at the Department of Periodontology, Rajarajeswari Dental College & Hospital, Bangalore. Ethical clearance was obtained prior to the study. A total of 15 patients were recruited for the study. The patients were explained about the procedure and a written informed consent was obtained from them.

Group I: - Tetracycline group in which the sites will be treated by SRP followed by subgingival placement of tetracycline fibres

Group II: - Propolis group in which the sites Will be treated by SRP followed by subgingival placement of Indian propolis.

Inclusion criteria:

1. All subjects between 20-60 years of age, willing to participate in the study.
2. The subjects must have atleast 20 teeth in case of chronic periodontitis with probing depth of ≥ 5mm on at least 1 tooth per quadrant.
3. All the patients should be systemically healthy and should not have received periodontal treatment for at least 6 months prior to the clinical examination and sampling.

Exclusion criteria:

Patients with systemic diseases, pregnant and lactating women, alcoholics and smokers were excluded from the study.

Screening examination includes:

All the participants will be explained about the need and design of the study. Written informed consent for the study will be obtained from each patient. Those who have been selected for the study will undergo a full mouth periodontal probing, charting and will be screened for their suitability for the study. A proforma will be designed for the present study so as to have a systematic and methodical recording of all observations and information. The relevant data will be recorded in the proforma.

Recording of clinical parameters:

1. Gingival index (GI) (Loe H and Silness - 1963).
2. Plaque index (silness and loe)
3. Probing pocket depth (PPD) measured using graduated Williams periodontal probe from the crest of gingival margin to base of the pocket.
4. Clinical attachment level (CAL) measured from CEJ to base of the pocket**.**

In every patient, the selected sites will be marked and assigned randomly either to Group 1 or Group 2 by a flip of a coin. On their first visit, all the clinical measurements will be performed at six sites per tooth. After baseline examination sites will be treated with SRP followed by subgingival administration of Propolis. The clinical measurements will be recorded at baseline, 2 weeks and 3 months post drug delivery.

Technique for Drug Delivery

A plastic filling instrument will be used to carry and place propolis and tetracycline fibres into the test sites, after completion of SRP. The drug will be placed such that it is not exposed to the oral cavity. Normal oral hygiene will be observed. Patient will be advised to avoid proximal cleaning until seven days after treatment of the test sites.

RESULTS

The age and gender wise distribution of the patients included in the study is listed in table 1.

The data was analysed using student paired t test for intergroup comparison and Wilcoxon signed rank test for intragroup comparison. The clinical parameters of PI, GI, PPD and CAL, recorded from patients in both the groups are shown in table 2 and 3.

The intergroup comparison revealed that there was a significant reduction in the all the parameters from baseline and at 3 months and the difference was seen to be marginally higher in the group II (Propolis) when compared with the group I (tetracycline) at all intervals. Also the intragroup comparison revealed that there was a significant difference in the value of PI and GI at

baseline, 2 weeks and 3 months. There was a significant reduction in the PPD from baseline to 3 months and significant increase in the CAL from baseline to 3 months.

Table 1. Age and gender wise distribution of the study

No of patients	Gender	No. of patients	No. of sites	P* value
15	M	9	18	0.05
	F	6	12	

Table 2. Gingival and plaque indices of patients in test and control groups

		Mean value at baseline	Mean value at 2 weeks	Mean value at 3 month	Mean difference between baseline and 3 month
Group I	PI	1.991±0.379	1.341±0.077	0.901±0.130	1.09±0.249*
	GI	1.825±0.247	1.201±0.155	0.375±0.203	1.45±0.044*
Group II	PI	1.966±0.358	1.221±0.032	0.882±0.176	1.084±0.182*
	GI	1.841±0.258	1.113±0.101	0.141±0.142	1.7±0.116*

*Significance value (P) set at 0.05

Table 3. Probing pocket depths and clinical attachment level of patients in test and control groups

		Mean value at baseline	Mean value at 3 months	Mean difference with standard deviation
Group I	PPD	6.000±0.694	4.333±0.479	1.667±0.215*
	CAL	7.966±0.764	6.433±0.727	1.533±0.037*
Group II	PPD	6.400±0.894	3.766±0.626	2.634±0.268*
	CAL	8.020±0.900	6.266±0.868	1.754±0.032*

*Significance value (P) set at 0.05.

Figure 1. Propolis as Local Drug Delivery Agent

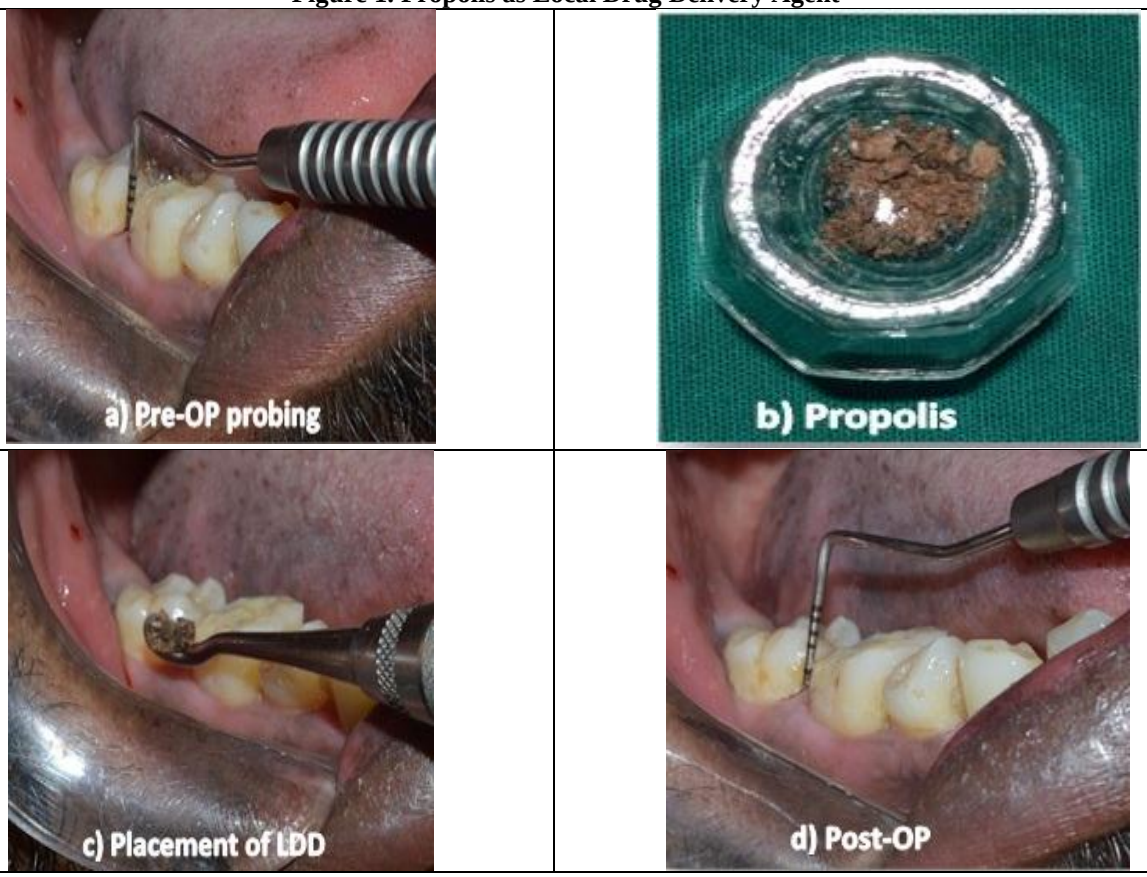
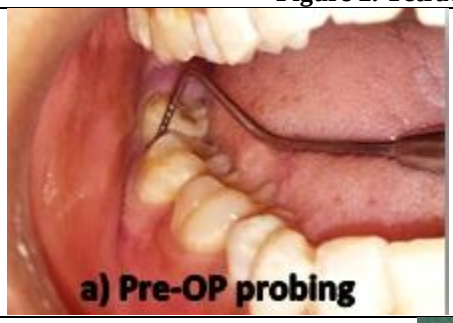
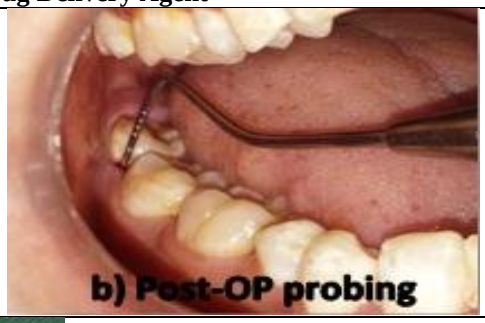


Figure 2. Tetracycline as Local Drug Delivery Agent





DISCUSSION

Periodontitis, initiated by bacteria, frequently appears in localized areas in the patient's mouth or is confined to localized areas by treatment. These infected localized areas lend themselves well to treatment using an antimicrobial agent. Antimicrobial agents may be used systemically or can be applied directly to the pocket. [7]

In order to obtain an effective concentration of the antimicrobial drug in the periodontal pocket after systemic administration, repeated intakes over a prolonged period of time may be required. In addition, unwanted effects such as development of resistant strains and superimposed infections preclude the use of these agents as the sole treatment modality. Various non resorbable and resorbable intrapocket drug delivery systems have been used, to eliminate many of the adverse side effects associated with systemic delivery of antibiotics. [8]

The main objective of the periodontal therapy is to reduce or eliminate the periodontal pocket, which can be carried out by non-surgical or surgical methods. Twenty years ago, Goodson *et al*. (1979) first proposed the concept of "controlled delivery of antibiotics" in the treatment of periodontitis. In 2014, Malathi *et al.* concluded from their study that locally delivered antimicrobial agents are administered to prevent plaque accumulation and to disinfect the root surface and adjacent periodontal tissues. They are designed to enhance the healing following periodontal therapy. [9]

The present study also aims at evaluating the efficacy of one such local drug delivery agent prepared from Propolis. The effects of Propolis as LDD are compared to that of tetracycline fibres. The results of this study have shown significant reduction in the clinical parameters with both the groups and more so with the group treated with Propolis as LDD.

The sites in group I were treated with collagen-impregnated tetracycline fibres was used which was found to be advantageous in improving the periodontal status. Tetracyclines are superior to other antibiotics as they are the only class of antibiotics which has the ability for retention to the tooth cementum and soft tissues. [10] The substantivity of tetracyclines have proved to be effective against gram-positive and gram-negative anaerobic microflora associated with chronic adult periodontitis. They exert their antimicrobial effect by inhibiting protein synthesis. [11] The improvement in GI and PI in the group I can be attributed to the antibacterial activity [12], effect on collagen breakdown [13] and substantivity of tetracycline when delivered as LDD. [10]

The sites in group II were treated with propolis delivered locally in the periodontal pocket sites. The flavonoids present in Propolis are responsible for its antibacterial activity. [14] Propolis mechanism of antimicrobial action, though not completely understood, seems to be complex and may vary according to its composition. As an anti-inflammatory agent, propolis is shown to inhibit synthesis of prostaglandins, aid the immune system by promoting phagocytic activity, stimulate cellular immunity, and augment healing effects on epithelial tissues. Additionally, propolis contains elements, such as iron and zinc that are important for the synthesis of collagen. All these properties could have led to improvement in the PI and GI in this group. [15]

Koo *et al*. carried a study to evaluate the effect of a mouthrinse containing propolis on 3day dental

plaque accumulation. They concluded that Propolis was efficient in reducing supragingival plaque formation and insoluble polysaccharide formation under conditions of high plaque accumulation. [16]

Another study conducted by Sanghani NN in 2014, concluded that subgingival delivery of propolis showed promising results as an adjunct to SRP in patients with chronic periodontitis when assessed by clinical and microbiological parameters. [17]

CONCLUSION

The results of the present study have shown that the Propolis is marginally better than tetracycline fibres as a local drug delivery agent in treating chronic periodontitis.

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